

The 2003 FIRST Robotics Competition  
**TEAM UPDATE #1**

Date: January 7, 2003

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**PLEASE DISTRIBUTE THIS TO OTHER TEAM MEMBERS!**

FIRST will provide rules updates and other important information to teams via the FIRST web site at:

<http://www.usfirst.org/robotics/2003/docs.htm>

Please check the team updates portion of the web site on a regular basis to insure that your team does not miss critical information about the 2003 FIRST Robotics Competition. FIRST recommends assigning at least one team member the duty of keeping up to date on all team updates. This person or group should be responsible for distributing information contained in team updates to the appropriate team members.

<p><b><u>QUESTIONS?</u></b></p>
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**In order to post questions on our message board at:**

<http://jive.ilearning.com/index/jsp>

- You **must** reference the particular section of the manual you are questioning or your question will not be answered. This will help us give you the most accurate answer possible.
- Limit each message board submittal to ask only 1 question at a time. This will allow us to categorize your question and will enhance our ability to respond in a timely manner.
- Please do not reply to posted messages. FIRST is the only official source for answers. Replies other than from FIRST will be deleted.

**The message board was deluged with questions over the weekend. We are working to clear up the backlog as quickly as possible.**

<p><b><u>THE GAME</u></b></p>
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**PAGE 5, SECTION 7.6, 1<sup>ST</sup> PARAGRAPH**

Replace section 7.6, 1<sup>st</sup> paragraph, with the following:

All containers within the alliance's scoring zone will be worth one point each EXCEPT the containers in the tallest stack. The total number of one-point containers will determine the base score for the alliance. The tallest stack of containers within the scoring zone is the "multiplier stack." Containers in the multiplier stack are worth zero points each (note that containers in other stacks of the same height are worth one point each). The total base score is then multiplied by the height in whole Stack Height Units (SHU) of the multiplier stack. A whole Stack Height Unit is **14-3/4 inches**, which is the height of an individual container nested in a stack. More than one stack of the same height does not affect the multiplier. Whole Stack Height Units will be measured with an Official Stack Height Measuring device. The Official Stack Height Measuring Device will be marked in increments of **14-3/4 inches**

(one wSHU). The details of this device will be released at a later date.

#### PAGE 10, RULE SC8

Replace SC8 with the following:

When determining the base score for the alliance, the referees will evaluate the containers with the following criteria:

- The total number of containers “in” a Scoring Zone will be counted and assigned one point each. A container will be determined to be “in” a scoring zone if at least some part of the container is touching the colored carpet that defines a scoring zone or is supported exclusively by:
  - Other containers “in” that zone (note: this means that if one container rests entirely in the gray “no score zone” and another container is stacked on top of it that overhangs the scoring zone, neither container will be considered to be “in” the scoring zone);
  - An opponent’s robot “in” the scoring zone.
- The height of the tallest stack located in the scoring zone (the “multiplier stack”), measured in whole Stack Height Units (as defined in SC9) is subtracted from the total number of containers to establish the “base score.” Containers in additional stacks of the same height will be scored normally;
- If ANY part of your own alliance’s robots are in contact with ANY container in a stack (alone or in a multi-container stack), ALL containers in that stack will be worth zero points;
- Opponent robots in contact with containers in the alliance scoring zone will not affect the determination of the base score;
- A container may touch the field border.

#### PAGE 10, RULE SC9

Replace SC9 with the following:

When identifying the multiplier stack, the referees will base their evaluation on the following criteria:

- Only stacks located “in” a scoring zone (as defined in SC8) are eligible to become multiplier stacks;
- The tallest stack in the alliance scoring zone will be determined to be the multiplier stack. Its height is measured in whole Stack Height Units (SHU) as described previously in Section 7.6. **Fractional stack heights are rounded down to the nearest SHU;**
- If ANY part of an alliance robot is in contact with ANY container in a stack, that stack will not be eligible to be the multiplier stack. In this event, the next-tallest stack will become the multiplier stack;
- There will only be one multiplier stack. If there are multiple stacks of the same height, the redundant stacks will be scored normally as part of the alliance base score;
- Opponent robot contact with a stack will not affect multiplier stack eligibility.

## PAGE 12, RULE SC15

Modify the 1<sup>st</sup> bullet to read as follows:  
All teams start each elimination round...

# **THE ROBOT**

## PBASIC 2.5 UPDATE

The version PBASIC 2.5 editor will not be released by Parallax until Friday, January 10<sup>th</sup>. On Friday, it will be released in beta form to FIRST teams only and will be available exclusively on the Innovation First, Inc. website ([www.innovationfirst.com](http://www.innovationfirst.com)). Due to this delay, we have released a second version of the default code that does not require the new editor.

## DEFAULT CODE UPDATE

There are two versions of default code loaded in the 2003 Robot Controller. The default code (DEF) is for 2-Stick driver control. The default code (USER) is for 1-Stick driver control.

The default code shipped in your Robot Controller (both USER and DEF) does not contain the code that stops PWM devices with limit switches. We recommend you re-load the default code (located at [www.innovationfirst.com](http://www.innovationfirst.com)) if this feature is needed.

The default code shipped also contains test code. This is activated with sw2 of the channel switch. If you intend to use a channel dongle to access alternate channels, we recommend you re-load the default code (located at [www.innovationfirst.com](http://www.innovationfirst.com)). Refer to the competition port pinout guide on the documentation page for information on accessing alternate channels.

## PAGE 12, SECTION 3.2.4

Delete Victor 883.

## PAGE 21, RULE C13

Modified to now read:

No more than one drill motor, CIM motor, fisher-price motor, globe motor or van door motor may be powered by each speed controller. The pneumatic pump may be powered by a speed controller using a 20a or 30a breaker.

## PAGE 24, CHART

Delete Victor 883.

## PAGE 29, KIT OF PARTS LIST, SERVO

Innovation First is not the supplier of the servo. They acquired the servo for FIRST through a distributor.

## PAGE 43, RESTRICTED PARTS LIST

Delete Victor 883.

## PAGE 46, BULLETED LIST

- PWM/Relay Cable: This is Innovation First style, not Hitec style and is available in 12", 24", and 36" lengths.
- PWM/Relay Y Cable: This is Innovation First style, not Hitec style.
- Delete Victor 883.

## KIT OF PARTS

### CLARIFICATION

You can only use the motors provided in the 2003 Kit of Parts in the quantities provided on your robot. You can purchase additional motors to have on hand as spares.

### SHIPPING OF KITS

FIRST unexpectedly ran out of several pneumatic parts before all of the kit packing was completed. We have received additional parts and the remaining kits should be shipped Wednesday or Thursday, 1/8 or 1/9. We apologize for the delay.

### MISSING OR BROKEN

For any missing parts or broken parts, please contact us at:

[freparts@usfirst.org](mailto:freparts@usfirst.org)

Remember to include your team number and contact information with phone number and/or e-mail address.

### NOT PROVIDED THIS YEAR

The 25-pin solder cup connector and the plastic shield for the 25-pin solder cup connector was not in your kit and will not be provided for 2003.

### 40AMP CIRCUIT BREAKERS

Due to a supplier delivery problem, there were no 40A MAXI-style auto-resetting circuit breakers provided in your kits. FIRST expects to ship these missing components to teams in the near future. In the interim, we suggest that teams temporarily connect their VICTOR Speed Controllers that operate the Drill and CIM motors to any unused positions in the two ATC style breaker panels provided and use the extra 30A Snap Action circuit breakers that were put in the kits to protect those specific loads.

**In no case** should teams use locally obtainable automotive after-market MAXI-style fuses or MAXI-style circuit breakers in these circuits because the surge current characteristics of the automotive components are not compatible with the VICTOR controllers.

## LATE SHIPMENT

The following items will be shipped to teams at a later date.

1. SMC pneumatic parts:
  - Double Solenoid Base Ported Valve
  - Flow Control
  - Fitting, Straight ¼" Tube
  - Fitting, 90 Elbow ¼" Tube
  - Fitting, Tee Union ¼" Tube
  - Fitting, Male Run T 1/8 NPT ~ ¼" Tube
  - ¼" OD Tubing
2. Metric key stock; fits the shaft on the CIM (Chiaphua/Atwood) motor only; size is 0.079" x 0.094" x 1"; 2 pieces
3. Reflexite retro-reflective tape, 6" sample
4. Various decals/stickers.
5. 40A Snap Action circuit breakers.

## MSC DIRECT SHIPMENT

If you haven't received the optical sensors from Banner, the MSC big blue book, and the Microsoft Visual Studio.net software, it will be coming soon. However, due to an error in shipment, only 740 copies of MS Visual Studio.net were provided for the 2003 season. Only the first 740 teams will be receiving this software in the MSC shipment.

## YAW RATE SENSOR CONNECTOR

The connector configuration for the yaw rate sensor for the 2003 season is different than the one in 2002 and FIRST was not aware of this change until recently. We are in the process of acquiring information on how to obtain the new connector; however, a connector is listed on the spec sheet provided with each yaw rate sensor.

## NUTS AND BOLTS

Your kit should have had one (1) bag of gearbox nuts, nylock ¼-20Z and one (1) bag of motor mount nuts, nylock ¼-20Z. Each bag contained 8 nuts. In fact, during our packing process, you may have gotten two (2) bags of one and none of the other. They are the same part so they are interchangeable.

## SUPPLIER LIST

The supplier list will be published this week. This list will show you what suppliers will sell directly to teams.

## BUYING PARTS MADE FOR FIRST

Instructions on how to obtain the parts that were made specially for FIRST will be published this week. Arrangements with an order fulfillment company are nearly complete.

## UPDATED 2003 KIT OF PARTS LIST

Below is an updated copy of the 2003 Kit of Parts Check List. Please disregard any other version.

# 2003 Kit by **CONTAINER** by Sub-Assembly for Manual

Date: 1/7/2003  
Time: 3:48:15 Pm

Container Weight: **64.67**

**Blue**

### Aluminum Hex 3"

<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/> Coupling, Aluminum, Solid, 1" Hex OD, 3" Long		Commercially available; aluminum; part of a 3-piece assembly for 8mm Chiaphua shaft	2	Northstar Steel and Aluminum, Inc

### Bearing Bag

<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/> Pillow Block		Manufactured for FIRST, aluminum, accepts bearing for 5/8" shaft	4	ComTech
<input type="checkbox"/> Flange, Two Bolt Self-Aligning, 40MST	40MST	Fits 1/2" Bearing	8	The Torrington Company
<input type="checkbox"/> Radial Ball Bearing, S7KDD, with Shields	S7KDD	5/8" I.D. - 1.375 OD - .344 Width	12	The Torrington Company
<input type="checkbox"/> Radial Ball Bearing With Spherical O.D., RA008RR	RA008RRB + COLLAR	1/2" I.D., Self Locking Collar	4	The Torrington Company

### Control System Box

<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/> Radio Modem for Robot Controller		RS-422, 9 pin F, rubber antenna	1	Innovation First, Inc
<input type="checkbox"/> Relay Module (Spike)		12V, 20A Max	4	Innovation First, Inc
<input type="checkbox"/> Robot Controller			1	Innovation First, Inc
<input type="checkbox"/> Speed Controller (Victor 884)	Victor 884		4	Innovation First, Inc

### Loose

<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/> Quick-Disconnect Power Connector (with 1' leads)	6331G1	#6 AWG Red/Black Wire, pair	2	Anderson Power Products

## 2003 Kit by CONTAINER by Sub-Assembly for Manual

Date: 1/7/2003

Time: 3:48:15 Pm

<input type="checkbox"/>	1 Conductor Wire	C2107-41-03	35', #10 AWG, Red	1	BICC General
<input type="checkbox"/>	1 Conductor Wire	C2107-01	35', #10 AWG, Black	1	BICC General
<input type="checkbox"/>	2 Conductor Jacketed Wire	C2405-41-10	35', #16 AWG	1	BICC General
<input type="checkbox"/>	2 Conductor Jacketed Wire	C2461-21-10	30', #24 AWG	1	BICC General
<input type="checkbox"/>	3 Conductor Shielded Wire	C0741-21-10	30', #24 AWG	1	BICC General
<input type="checkbox"/>	1 Conductor Wire	#6 AWG Black	10', #6 AWG, Black	1	Delphi Connection Systems
<input type="checkbox"/>	1 Conductor Wire	#6 AWG Red	10', #6 AWG, Red	1	Delphi Connection Systems
<input type="checkbox"/>	Muffin Fan (Large)	4212/2-534	12 Vdc	1	EBM Industries
<input type="checkbox"/>	Muffin Fan (Tiny)	412	12 Vdc	5	EBM Industries
<input type="checkbox"/>	Battery	EX18-12	12 volt, 18 AH Deep Cycle Non-Spillable	2	Exide Technologies
<input type="checkbox"/>	(GB), Bolt, 307AHB 1/4-20 x 6.5Z, Hex Head	11026	For gear box	1	Fastenal
<input type="checkbox"/>	(GB), Nut, NYLOCK NE 1/4-20Z	37018	For gear box bolts	1	Fastenal
<input type="checkbox"/>	(GB), Washer, Flat, 1/4" Hole, USS F/W 1/4Z	33004	Washer for gearbox fastening bolts	1	Fastenal
<input type="checkbox"/>	(MM), Bolt, Motor Mount, 1/4-20 x 1"; 307AHB 1/4-20 x 1Z	1005	Bolt	1	Fastenal

## 2003 Kit by CONTAINER by Sub-Assembly for Manual

Date: 1/7/2003

Time: 3:48:15 Pm

<input type="checkbox"/>	(MM), Bolt, Motor Mount, 1/4-20 x 3-1/4"	13016	Bolt	1	Fastenal
<input type="checkbox"/>	(MM), Bolt, Motor Mount, 10-32 x 2"; SHCS 10-32	23172	Bolt	1	Fastenal
<input type="checkbox"/>	(MM), Nut, Motor Mount, 1/4-20; NYLOCK NE 1/4-20Z	37018	Nuts	1	Fastenal
<input type="checkbox"/>	(MM), Nut, Motor Mount, 10-32; NYLOCK NM 10-32Z	37015	Nuts	1	Fastenal
<input type="checkbox"/>	(MM), Washer, Motor Mount, 1/4-20; SAE F/W 1/4"	33078	Washers; washer under bolt head and nut	1	Fastenal
<input type="checkbox"/>	(MM), Washer, Motor Mount, 10-32; SAE F/W (#10) Z	33074	Washers; washer under bolt head and nut	1	Fastenal
<input type="checkbox"/>	(TR), Nut, NYLOCK NE 3/8-16Z	37024	3/8" nut for threaded rod	1	Fastenal
<input type="checkbox"/>	(TR), Washer, Flat, 3/8" Hole, USS F/W 3/8Z	33008	Flat washer for 3/8" threaded rod	1	Fastenal
<input type="checkbox"/>	Motor, Globe, with Drive Assembly	409A587	12Vdc	2	Globe Motors
<input type="checkbox"/>	15-Pin Molded Cable	DB15MM	DB15 pin M-M, 6 feet	2	Innovation First, Inc
<input type="checkbox"/>	9-Pin Cable	DB9MF	DB9 Male to Female, 6', Shielded	4	Innovation First, Inc
<input type="checkbox"/>	Ramp Surface Material, Kit Sample, 12" x 18"		Carbon steel wire cloth, 1" mesh, .118 wire diameter	1	McNichols Co.
<input type="checkbox"/>	Battery Charger, Automatic	cxc-2005	6A.	1	Midtronics (Exide spinoff)

## 2003 Kit by **CONTAINER** by Sub-Assembly for Manual

Date: 1/7/2003  
Time: 3:48:15 Pm

### Seat/Window Bag

	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Coupler to Nippon-Denso Motor Gear		Injection molded	2	DEKA
<input type="checkbox"/>	Flexible Shaft Coupling	None	Black	2	DEKA
<input type="checkbox"/>	Worm Gear Actuator-Left Hand	0113-0185	2 inch linear movement	1	Excellence Manufacturing, Inc.
<input type="checkbox"/>	Worm Gear Actuator-Right Hand	0113-0184	2 inch linear movement	1	Excellence Manufacturing, Inc.
<input type="checkbox"/>	Flexible Motor Shaft	16723160	13.5" Long, Fits Seat Motor	2	Grand Rapids Controls

Container Weight: **0**

**Direct From External Vendor**

### Autodesk Direct Ship

	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	3D Studio Max 5, Autodesk		Includes Character Studio - see separate record	1	Autodesk
<input type="checkbox"/>	Animations from 2002 Season, Autodesk		1 DVD	1	Autodesk
<input type="checkbox"/>	Character Studio, Autodesk		Included with 3D Studio Max 5	1	Autodesk
<input type="checkbox"/>	Inventor Series 6, Autodesk		Includes Mechanical Desktop - see separate record	1	Autodesk
<input type="checkbox"/>	Manufacturing Education Curriculum 2002 for Autodesk 5.3 and Autodesk Streamline, Autodesk		1 CD	1	Autodesk
<input type="checkbox"/>	Mechanical Desktop, Autodesk		Included with Inventor Series 6	1	Autodesk

## 2003 Kit by **CONTAINER** by Sub-Assembly for Manual

Date: 1/7/2003

Time: 3:48:15 Pm

<input type="checkbox"/>	Training Booklet and CD, Inventor Series 6, Autodesk		1 CD	1	Autodesk
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**Container Weight: 56.236**

**Red**

### Catalog Bag

<input type="checkbox"/>	Part Name/Description	Part Number	Dimensions	Kit	Supplier
<input type="checkbox"/>	Anderson Power Products Catalog		Catalog	1	Anderson Power Products
<input type="checkbox"/>	Video, Compilation of Past Competitions		Video	1	FIRST
<input type="checkbox"/>	McNichols, Catalog, Stickers, Rulers		Catalog and trinkets	1	McNichols Company
<input type="checkbox"/>	Magazine, Nut and Volts			1	Nuts and Volts

### Drill Bag

<input type="checkbox"/>	Part Name/Description	Part Number	Dimensions	Kit	Supplier
<input type="checkbox"/>	Screw, Left-Hand for Bosch 1/2" Drill Drive Assembly			2	ADM Tool
<input type="checkbox"/>	Mount for 1/2" Drill Motor; 4 Pieces		Injection molded	2	NYPRO, Inc
<input type="checkbox"/>	Drill Drive Assembly (Transmission), 1/2"	2606200917	2 Speed -12.07:1 & 42.62:1 Gear Ratios	2	S-B Power Tool
<input type="checkbox"/>	Motor Assembly, 1/2"	2607022890	0.87Nm @ 127A stall, 19670RPM No-Load	2	S-B power Tool Co.

### Drive Train Bag

<input type="checkbox"/>	Part Name/Description	Part Number	Dimensions	Kit	Supplier
<input type="checkbox"/>	(GB), Gearbox, Clamping Plate for 2" x 4" Frame (can be used on smaller stock)		Injection Molded	2	Nypro

## 2003 Kit by **CONTAINER** by Sub-Assembly for Manual

Date: 1/7/2003

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<input type="checkbox"/>	(GB), Gearbox, Pillow Block Half		Injection Molded	8	Nypro
<input type="checkbox"/>	(GB), Gearbox, Pillow Block Mounting Plate, Used in Pairs		Injection Molded	4	Nypro

### **Gear Bag**

<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/> Gear, 1" Helical, 5/8" Keyed Bore, Right Hand	H1212R		2	Boston Gear
<input type="checkbox"/> Gear, 2" Helical, 5/8" Keyed Bore, Right Hand	H1224R		2	Boston Gear
<input type="checkbox"/> Key Stock, Step, 1/8"+3/16" x 12"		1/8" and 3/16" step key stock; the 1/8" side fits the 1" and 2" gears; the 3/16" side fits the 5/8" shaft; 12" piece		ITW Bee Leitzke

### **Loose**

<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/> Yaw Rate Sensor	98120313903		1	BEI Systron Donner Inertial Division
<input type="checkbox"/> Motor, Van Door, Bosch	6004FA0009	12 Vdc, 75 RPM	1	Bosch Automotive
<input type="checkbox"/> Motor, CIM (aka Chiaphua or Atwood), 8mm keyed output shaft		8mm keyed output shaft	2	CCL Industrial Motor, LTD
<input type="checkbox"/> LED, Panel Mount	5102H5-12V	Green, 12V	2	Chicago Miniature Lamp, Inc
<input type="checkbox"/> Maxi Block, 4 Terminated Leads, 1 of 5 pieces	12077734	Maxi-style circuit breakers only; top, insert, fuse block, bolt, 4 terminated leads	1	Delphi Connection Systems
<input type="checkbox"/> Maxi Block, Fuse Block, 8 Position; 1 of 5 pieces	12077532	Maxi-style circuit breakers only; top, insert, fuse block, bolt, 4 terminated leads	1	Delphi Connection Systems
<input type="checkbox"/> Maxi Block, Insert, 8 Position, 1 of 5 pieces	12092231	Maxi-style circuit breakers only; top, insert, fuse block, bolt, 4 terminated leads	1	Delphi Connection Systems

## 2003 Kit by **CONTAINER** by Sub-Assembly for Manual

Date: 1/7/2003

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<input type="checkbox"/>	Maxi Block, Top, 1 of 5 pieces	12077734	Maxi-style circuit breakers only; top, insert, fuse block, bolt, 4 terminated leads	1	Delphi Connection Systems
<input type="checkbox"/>	Nippon-Denso Motor, Window, Right			2	Denso International America, Inc.
<input type="checkbox"/>	(GB), Washer, Belleville (Disc Spring)	MB1250-040	1.250 x 0.630 x 0.0400; for preloading in the gear box; Gardiner Spring 800-331-3263; come in pkg of 12	5	Fastenal
<input type="checkbox"/>	Maxi Block, Bolt, 20mm Flanged, With Yellow Zinc Plating, 1 of 5 pieces	MG x 1	Maxi-style circuit breakers only; top, insert, fuse block, bolt, 4 terminated leads; 20mm flanged, with yellow zinc plating	1	Fastenal
<input type="checkbox"/>	Retaining Rings for 5/8" Keyed Shaft			1	Fastenal
<input type="checkbox"/>	FedEx Airbills			3	FedEx
<input type="checkbox"/>	FedEx Envelope - Introduction Letter			1	FedEx
<input type="checkbox"/>	FedEx Pouch			3	FedEx
<input type="checkbox"/>	Fisher-Price 10 Web Jeep Driver	74460-2249D	Black	2	Fisher-Price, Inc.
<input type="checkbox"/>	Motor/Gearbox, Fisher-Price	174370-5995	12 Vdc stall torque (mNm) 532.19+/- 10%; 21T #7 Gearbox	2	Fisher-Price, Inc.
<input type="checkbox"/>	Breaker, Buss, Ckt Breaker / Disconnect Switch	185-120-F01-1	120A., automotive style	1	Innovation First, Inc
<input type="checkbox"/>	Breaker Panel	15600-12-21	ATC, 100A. max	2	Innovation First, Inc
<input type="checkbox"/>	PWM/Relay Cable	PWM-EXT	Hitec/JR-style, 36" Long	8	Innovation First, Inc
<input type="checkbox"/>	PWM/Relay Y Cable	PWM-Y	Hitec/JR-style, 24" Long	2	Innovation First, Inc

## 2003 Kit by **CONTAINER** by Sub-Assembly for Manual

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<input type="checkbox"/>	Servo	HS-322S	42 oz./in. peak torque, 0.19 sec./60°	2	Innovation First, Inc
<input type="checkbox"/>	Snap-Action Circuit Breaker	VB3-A30-F57	30 amp, 12 volt, Auto-Resetting	7	Innovation First, Inc
<input type="checkbox"/>	Snap-Action Circuit Breaker	VB3-A20-F57	20 amp, 12 volt, Auto-Resetting	5	Innovation First, Inc
<input type="checkbox"/>	Revolving Light, Taiwan	CG-30	with red and blue lenses	1	Juluon Enterprise Co., Ltd (Taiwan)
<input type="checkbox"/>	Lead Screw w/ Nut	P7000658	12" Long	1	Kerk Motion Products, Inc.
<input type="checkbox"/>	Microsoft, Front Page			1	Microsoft
<input type="checkbox"/>	Microsoft, Project			1	Microsoft
<input type="checkbox"/>	High-Density Polyethylene (HDPE)		Smooth; 6" x 6" x 1/4" kit sample; this is thinner than the platform material but is to demonstrate the surface	1	Plastic Supply
<input type="checkbox"/>	Wheel, 9", Skyway		5/8" keyed hub	2	Skyway Recreation Products
<input type="checkbox"/>	Wheel, Wheelchair, 6"	WHL70C	6" Ø, 5/16" I.D. Bearings, 1-1/2" Wide Flange	2	Skyway Recreation Products
<input type="checkbox"/>	15-Pin Solder Cup Connector	747909-2	DB15 Female	2	TYCO Electronics Foundatio

### **Pneu - Bracket/Clevis**

<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/> Pneumatics Kit, Pivot Bracket Set, Cylinder, Parker	LO7131 0300		1	Various
<input type="checkbox"/> Pneumatics Kit, Rod Clevis, Cylinder, Parker	LO7130 0400		1	Various

## 2003 Kit by **CONTAINER** by Sub-Assembly for Manual

Date: 1/7/2003  
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### **Pneu - Compressor/Relief**

<input type="checkbox"/>	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Pneumatics Kit, Compressor, Thomas	405ADC38-12		1	Various
<input type="checkbox"/>	Pneumatics Kit, Relief Valve, 120psi, Norgren	16-004-015	120psi	1	Various

### **Pneu - Festo Valve Kit**

<input type="checkbox"/>	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Pneumatics Kit, Valve Kit, Solenoid, With Fittings, Festo	MFH-5-1/8		1	Various

### **Pneu - Monnier 2ndary Reg**

<input type="checkbox"/>	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Pneumatics Kit, Secondary Pneumatic Regulator, Monnier	101-3002-1		1	Various

### **Pneu - Monnier Reg Bracket +**

<input type="checkbox"/>	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Pneumatics Kit, Regulator Mounting Bracket and Nut, Monnier	13536		1	Various

### **Pneu - Nason Switch**

<input type="checkbox"/>	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Pneumatics Kit, Pressure Switch Opens @ 115psi, Closes @ 95psi, Nason	SM-2B-115R		1	Various

### **Pneu - Norgren Gauge**

<input type="checkbox"/>	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Pneumatics Kit, 0-160psi Gauge for Norgren Regulator, Norgren	18-013-212		2	Various

### **Pneu - Norgren Reg Bracket+Nut**

<input type="checkbox"/>	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Pneumatics Kit, Regulator Mounting Bracket and Nut, Norgren	18-025-003		1	Various

## 2003 Kit by **CONTAINER** by Sub-Assembly for Manual

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### **Pneu - Norgren Regulator**

<input type="checkbox"/>	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Pneumatics Kit, Main Regulator with 60psi Max Output, Norgren	R07-153-RNEA		1	Various

### **Pneu - Parker Brass Bag**

<input type="checkbox"/>	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Pneumatics Kit, Adaptor 1/4" Female to 1/8" Male, Parker	222P-4-2		6	Various
<input type="checkbox"/>	Pneumatics Kit, Bushing 1/8" Female to 1/4" Male, Parker	209P-4-2		12	Various
<input type="checkbox"/>	Pneumatics Kit, Hex Nipple 1/8" NPT, Parker	216P-2		6	Various
<input type="checkbox"/>	Pneumatics Kit, Manual 2-Way Plug Valve, Parker	PV609-2		1	Various
<input type="checkbox"/>	Pneumatics Kit, Plug 1/4", Parker	218-4		6	Various
<input type="checkbox"/>	Pneumatics Kit, Plug 1/8", Parker	218-2		6	Various
<input type="checkbox"/>	Pneumatics Kit, Union Tee, Parker	2203P-2		4	Various

### **Pneu - Parker Cylinder**

<input type="checkbox"/>	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Pneumatics Kit, Cylinder, Parker	1.50DPSR8.00	1.5" bore x 8" stroke; rear pivot mount	1	Various

### **Pneu - Teflon/Vibration Feet**

<input type="checkbox"/>	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Pneumatics Kit, Teflon Tape, 1/4" x 100'			1	Various
<input type="checkbox"/>	Pneumatics Kit, Vibration Isolators for Compressor, Lord Corp	SMB003-0100-2		1	Various

## 2003 Kit by **CONTAINER** by Sub-Assembly for Manual

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### Pneu - Volume Tank

<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/> Pneumatics Kit, Volume Tank, Clippard	AVT-32-16	16 cu. in., 2" x 8"	2	Various

### Pneu - Wika Gauge

<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/> Pneumatics Kit, 0-160psi Gauge for Norgren Regulator, Wika			1	Various

### Spring Bag

<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/> Spring, Compression	C03000471500MYD	Yellow	6	Associated Spring Raymond
<input type="checkbox"/> Spring, Compression	C03600510620MZP	Silver	6	Associated Spring Raymond
<input type="checkbox"/> Spring, Compression	C0300-054-3000	Blue	1	Associated Spring Raymond
<input type="checkbox"/> Spring, Compression	C0180-014-0880-mzp	Small Silver	8	Associated Spring Raymond
<input type="checkbox"/> Spring, Compression	C0240-022-0500-MZP	Small Brass	4	Associated Spring Raymond
<input type="checkbox"/> Spring, Compression	C0300-0451000-mzp	Med. Brass	7	Associated Spring Raymond
<input type="checkbox"/> Spring, Compression	C0240-042-2250-s	Med. silver	6	Associated Spring Raymond
<input type="checkbox"/> Spring, Extension	E01800261000MB0	Black	3	Associated Spring Raymond
<input type="checkbox"/> Spring, Extension	E0180-022-0750-MZP	Small Silver	6	Associated Spring Raymond

## 2003 Kit by **CONTAINER** by Sub-Assembly for Manual

Date: 1/7/2003  
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### Wire Wrap/Velcro Fastener Bag

<input type="checkbox"/>	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Helical Plastic Wire Wrap	2NFP9C	1/4" Ø x 24"	1	Hellermann Tyton
<input type="checkbox"/>	Helical Plastic Wire Wrap	3NFP0C	1/2" Ø x 24"	1	Hellermann Tyton
<input type="checkbox"/>	Velcro grip tie (2 in a pack)	SPLTHGRIP sample pack	6"x 1"	1	Hellermann Tyton
<input type="checkbox"/>	Velcro Grip Ties	GT.50X80C2	8" x 1.75"	2	Hellermann Tyton
<input type="checkbox"/>	Latex Tubing	5234k44	1/4" I.D., 3/8" O.D., 5'	2	Kent Elastomer
<input type="checkbox"/>	Velcro 18" One Wrap grip tie	170778	1"x18" grip tie White	2	Velcro USA, Inc.

### Woodie Coupling/Key Bag

<input type="checkbox"/>	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Coupling, 1/2" Drill Motor, Aluminum, accepts 1/2" Drill Shaft, 1" Hex OD		Fabricated for FIRST; aluminum; part of a 3-piece assembly for 1/2" Skil-Bosch	2	ComTech
<input type="checkbox"/>	Coupling, 1/2" Drill Motor, Aluminum, accepts 5/8" Keyed Shaft, 1" Hex OD		Fabricated for FIRST; aluminum; part of a 3-piece assembly for 1/2" Skil-Bosch	2	ComTech
<input type="checkbox"/>	Coupling, Aluminum, accepts 8mm Chiaphua Shaft, 1" Hex OD		Fabricated for FIRST; aluminum; part of a 3-piece assembly for 8mm Chiaphua shaft	2	ComTech
<input type="checkbox"/>	Coupling, Plastic, Round, 1/2" Skil-Bosch, Accepts Hex Both Sides	1"	Fabricated for FIRST; plastic; part of a 3-piece assembly for 1/2" Skil-Bosch	2	DEKA
<input type="checkbox"/>	Coupling, Plastic, Round, Chiaphua, Accepts 1" Hex Both Sides		Fabricated for FIRST; plastic; part of a 3-piece assembly for 8mm Chiaphua shaft	2	DEKA
<input type="checkbox"/>	Key Stock, 3/16" x 12"		3/16" key stock; fits 5/8" shaft but not the or 2" gears	1"	ITW Bee Leitzke

## 2003 Kit by CONTAINER by Sub-Assembly for Manual

Date: 1/7/2003  
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Container Weight: 0

**Separate Box**

**Metal Box**

	Part Name/Description	Part Number	Dimensions	Kit	Supplier
<input type="checkbox"/>	(GB) Spacer, Steel		Spacer for 2" x 4" material; 0.277 ID; 0.375 OD; 1.75" long	3	AM Industries
<input type="checkbox"/>	(MM) Spacer, Steel		Spacer for 2" x 4" material; 0.277 ID; 0.375 OD; 1.75" long	4	AM Industries
<input type="checkbox"/>	(TR) Spacer, Steel		Spacer for 2" x 4" material; 0.495 ID; 0.625 OD; 1.75" long	5	AM Industries
<input type="checkbox"/>	Fisher-Price Axle	7/16" Ø x 26"	7/16" Ø x 26"	1	Fisher-Price, Inc.
<input type="checkbox"/>	Shaft, 5/8" Keyed		5/8" keyed x 36"	1	G & G
<input type="checkbox"/>	Frame, 2" x 4" Extruded Aluminum		2" x 4" x 36"	2	Hadco
<input type="checkbox"/>	Pipe, 1" Aluminum		1" x 24" schedule 40	2	Hadco
<input type="checkbox"/>	(TR), Threaded Rod , 3/8"		3/8" Ø x 36", 20 Pitch Coarse Thread	2	Northstar
<input type="checkbox"/>	Shaft, DGP (drawn, ground, polished)	5/16" Ø x 18" DGP	5/16" Ø x 18" TGP	1	Northstar Steel and Aluminum, Inc
<input type="checkbox"/>	Shaft, DGP (drawn, ground, polished)	1/2" Ø x 18" DGP	1/2" Ø x 18" TGP	1	Northstar Steel and Aluminum, Inc.
<input type="checkbox"/>	(GB), Spacer, Pipe, for Gear Box		0.652 ID; 0.75 OD; 0.049 wall x 24"; tears! can cut it into lengths of their choice	1	Yarde Metals

Container Weight: 2

**Shipped from Curtis 1000**

## 2003 Kit by **CONTAINER** by Sub-Assembly for Manual

Date: 1/7/2003  
Time: 3:48:15 Pm

### Curtis 1000 Direct Ship

	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Manual - 2003 FIRST Robotics Competition			1	FIRST

Container Weight: **3.645**

**Shipped from FIRST**

### FIRST Direct Ship

	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Key Stock, Metric		Metric key stock; fits the shaft on the Chiaphua motor only; 0.079" x 0.094" x 1"	2	CCL Industrial (Chiaphua)
<input type="checkbox"/>	Connector for Yaw Rate Sensor	12064758	3 pin, 24 AWG x 12" cable	1	Delphi Packard Electric Systems
<input type="checkbox"/>	Snap-Action Circuit Breaker		40 amp, 12 volt, Auto-Resetting	4	Innovation First, INC
<input type="checkbox"/>	Reflexite, retroreflective, 1" wide x 6" long		This was bought in 2002 and we have enough for 2003	1	Reflexite

### Pneu - SMC Kit

	<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>
<input type="checkbox"/>	Pneumatics Kit, Double Solenoid Base Ported Valve SMC	NVJ5243Y-6G-01T		2	Various
<input type="checkbox"/>	Pneumatics Kit, Fitting, 90 Elbow 1/4" Tube, SMC	KQL07-34S		20	Various
<input type="checkbox"/>	Pneumatics Kit, Fitting, Male Run T 1/8 NPT ~ 1/4" Tube, SMC	KQY07-34S		5	Various
<input type="checkbox"/>	Pneumatics Kit, Fitting, Straight 1/4" Tube, SMC	KQH07-34S		20	Various
<input type="checkbox"/>	Pneumatics Kit, Fitting, Tee Union 1/4" Tube, SMC	KQT-07-00-Y		5	Various

## 2003 Kit by **CONTAINER** by Sub-Assembly for Manual

Date: 1/7/2003

Time: 3:48:15 Pm

<input type="checkbox"/>	Pneumatics Kit, Flow Control, SMC	NAS2201F-N01-07S		6	Various
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### **Pneu - SMC Tubing**

<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>	
<input type="checkbox"/>	Pneumatics Kit, 1/4" OD Tubing, SMC	TIUB07B-20	20 meters	1	Various

**Container Weight: 2.25**

**Shipped from IFI**

### **Innovation First Direct Ship**

<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>	
<input type="checkbox"/>	Flightstick Joystick	200-502 flightstick	7" Cable with Male DB15	2	Innovation First, Inc
<input type="checkbox"/>	Operator Interface			1	Innovation First, Inc
<input type="checkbox"/>	Power Supply for Operator Interface		9 Vdc	1	Innovation First, Inc
<input type="checkbox"/>	Radio Modem for Operator Interface		RS-422, 9 pin F, metal antenna	1	Innovation First, Inc

**Container Weight: 0.3**

**Shipped from MSC**

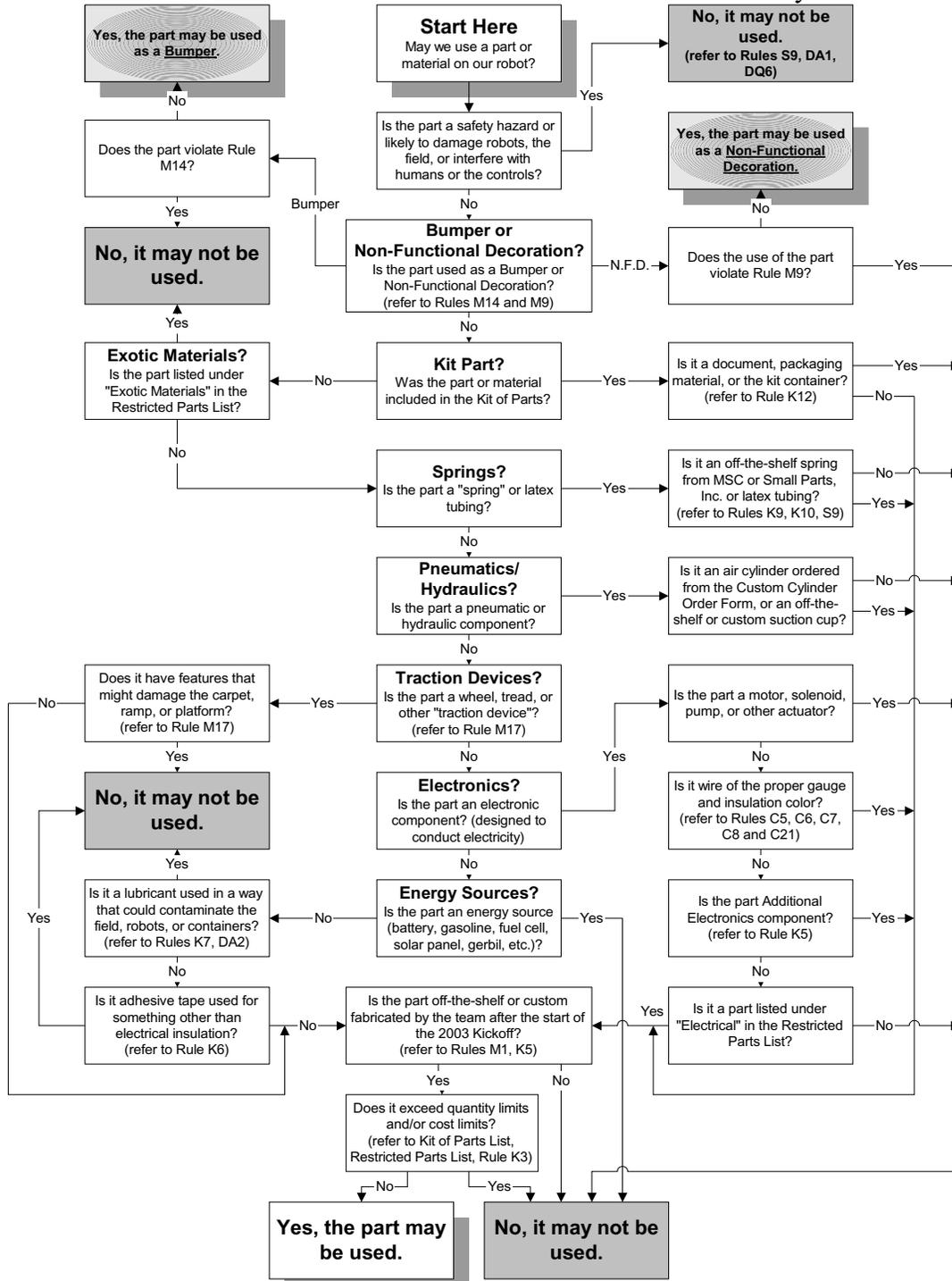
### **MSC Direct Ship**

<u>Part Name/Description</u>	<u>Part Number</u>	<u>Dimensions</u>	<u>Kit</u>	<u>Supplier</u>	
<input type="checkbox"/>	Optical Sensor	Qs18Vn6LV		3	Banner Engineering Corporation
<input type="checkbox"/>	FileMaker Pro			1	FileMaker
<input type="checkbox"/>	Microsoft, Visual Studio Net			1	Microsoft

# PART USE FLOWCHART - REVISED

## FLOW CHART

Please refer to this version of the Flow Chart for allowable materials on your machine.



## **FIELD CORRECTIONS**

### RAMP SURFACE

Please refer to the HDPE sample provided in your kit of parts before ordering. FIRST is using the smooth type.

### RAMP STRUCTURES

Blueprints for the wooden version of the Ramps are available on the FIRST web site at:

<http://www.usfirst.org/robotics/2003/docs.htm>

## **AUTODESK**

Autodesk has, once again this year, generously offered to render all the parts in the kit in Autodesk Inventor and make the “Virtual Kit Of Parts” available to all teams for use on Streamline. FIRST was unable to get all the kit of parts components to Autodesk in time for them to be available immediately after the Kickoff. The final group of parts was shipped to Autodesk on 1/2/03. Autodesk estimates that the Virtual Kit of Parts should be complete and available to teams using their Autodesk Streamline accounts by January 13<sup>th</sup>.

We apologize for the delay and express our sincere thanks to Autodesk for their continuing support of our programs.